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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,537	03/04/2002	Herbert Thanner	66376-279-7	1049

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EXAMINER	
VIJAYAKUMAR, KALLAMBELLA M	
ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/086,537	THANNER ET AL.	
	Examiner	Art Unit	
	Kallambella Vijayakumar	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 March 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/2*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

- Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.
- The information disclosure statement (IDS) submitted on 03/04/2002 and 01/29/2003 have been considered and acknowledged by the examiner.
- The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claims 24-31 provide for the use of pressure gauge/thermostatted oscillator/microbalance/ and electronic filter, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.
- Claims 24-31 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See

for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-6, 8-11 and 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Saakarov et al, (IEEE Frequency Control Symposium, 1992, Pages 713-723).

   Saakarov et al disclose the application of Langasite Crystals (LGS) in monolithic filters comprising cut single crystal resonators of langasite with an excitable fundamental frequency (Page-717: Column-1, Lines: 17-20) operating in the thickness shear mode with an electromechanical coupling coefficient tending to zero at ±90° that would meet the limitations of instant claim-1 (Page-713: Abstract, Introduction; Page-715: piezo---prop; Acoustic and piezo---crystals; Page 718: Elecro... , Line-9). Saakarov et al further disclose the cut single crystal LGS resonators operating in a thickness-shear mode shear mode over a frequency range of 5 MHz to 18.5 MHz {limitations of instant claims 1, 3-4} and in the temperature range of –60°C to 85°C {limitations of instant claims 10}. The LGS-crystal had

a spatial group P321 (Page-714, LGS-Crystal Structure) {limitations of instant claims 11 and 18}. Saakarov et al further teach cutting the LGS Crystal along either X-axis or Y-axis in the range of –30 to +45° (Page-715, Column-2) and the piezoelectrically active mode to be from –90 to +37° (Page:717, Col-1, Lines: 1-6, Fig-5) and a Y-cut of –55 to –85° would be anticipated {limitations of instant claims 15-16}. Saakharov et al further disclose the applications of Ca and Sr gallium-germanates as piezoelectric materials and the variance of the frequency constant measurement for the crystals would meet the limitations of instant claims 5-6 and 8-9 (Page: 717, Col-1 and Fig-6; Page-718, Freq. Vs temp characteristics, Fig-7-8; Page-722: Conclusion). The electromechanical coupling coeff data for the rotated Y-cuts would meet the limitations of the instant claims 1 and 2 (Fig-6; Page- 718, Col-1, Lines: 1-10).

A SPECIFIC EXAMPLE IN THE PRIOR ART WHICH IS WITHIN ACLAIMED RANGE ANTICIPATES THE RANGE: "[W]hen, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is anticipated' if one of them is in the prior art." Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985), MPEP 2131.03.

The Claim-7 introduces a product by process type of limitation and, when the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process, the claim is not patentable. See In re Marosi, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) And In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP §2113.

All the limitations of the instant claims are met.

The reference is anticipatory.

2. Claims 1-8, 10-14 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Reiter et al (15th European Frequency and Time Form, Neuchatel, 2001, 06 March, pages: 50-54).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Reiter et al disclose frequency measurements of thickness-shear and extensional resonators for the singly rotated Y-cut single crystals of GaPO4 by measuring the resonances of thickness shear and external resonators in the temperature range of –50°C to 700°C (Page-50, Col-1, Abstract, Elastic Constant). The anharmonic frequency and resonant frequency depended on curvature and could be measured only for singly rotated thickness shear Y-cut resonators measured at a frequency of 5100 to 5500 kHz (Fig-1). The Y-cuts at –84° produced low electromechanical coupling values that were lower than predicted 0.3-0.4% (Fig-6, Table-2) . The data in Figure-5 showed very little variance between the calculated and experimental data whereby the limitations of the claims 5-6 and 8 would be inherent. Reiter also teaches the heating of resonators up to 500°C after deposition of the electrodes. All the limitations of the instant claims are met.

The reference is anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1-18 and 20-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Saakarov et al, (IEEE Frequency Control Symposium, 1992, Pages 713-723) in view of Reiter et al (15th European Frequency and Time Form, Neuchatel, 2001, 06 March, pages: 50-54) or Zarka et al (IEEE Frequency Control Symposium, 1992, Pages 713-723, 1996, Pages 66-71) or Kochurikhin et al (J. Crystal Growth 1997, (181), Pages 452-454.

The disclosure by Saakarov et al on the piezoelectric element, properties and applications of cut single crystals of Langasite are set forth as in Rejection-1 under 35 USC 102(b). Saakharov et al do not explicitly disclose the method of making the piezoelectric element, but disclose all the elements involved in the fabrication of the element including cutting of the single crystal with an excitable fundamental frequency and attaching of electrodes to be functional in thickness shear mode of operation and evaluation of their piezoelectric properties, and it would have been obvious to one of ordinary skill in the art at the time the

invention was made to come up with the method for manufacture of the piezoelectric single crystal element meeting the limitations of the instant claims 20-21. Saakharov et al further disclose Cal and Sr gallium germinates to be piezoelectric materials.

Saakharov et al do not disclose or teach the piezoelectric elements of GaPO4 or heating the electrodes at temperature greater than 150°C.

The disclosure by Reiter et al on the piezoelectric element and properties of cut single crystals of GaPO4 are set forth as in Rejection-2 under 35 USC 102(b). Reiter et al teach cutting of GaPO4 single crystals, attaching electrodes and measuring of the piezoelectric properties under thickness shear mode of the crystal.

Zarka et al teach the resonators built on GaPO4 crystals using Y-rotated cut thickness shear resonators and their properties (Page-66: Abstract, Introduction, Table-1; Page-69: Section-IV, Table-2, Fig-10; Page-70, Fig-11).

Kochurikhin et al disclose the preparation and piezoelectric properties of the Sr3Ga2Ge4O14 single crystals (SGG), wherein the SGG showed superior piezoelectric properties comparable with that of LGS (Page 454 and Tables 1 and 2).

It would have been obvious to one of ordinary skill in the art to make modifications to the piezoelectric crystal element of Saakarov by optionally selecting GaPO4 single crystals per the teachings of either Reiter et al or Zakarov et al to benefit from superb temperature range of operation of the element and its sensitivity; or optionally select Sr3Ga2Ge4O14 per the teachings of Kochurikhin et al to benefit from superior piezoelectric properties and the elements; and further make obvious modifications to the process steps in the manufacture of the element per the teachings of Reiter et al and/or obvious adjustments to the using of the

crystal element, because all the teachings are in the analogous art of piezoelectric elements comprising of the same materials being claimed by the applicants and with the expectation of reasonable success in obviously arriving at the limitations of the instant claims by the applicants.

Conclusion

- The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huang et al (US Patent, 5,675,208), Vig et al (US patent 6,518,778) and Sugitomo et al (US patent 5,929,555).
- Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on M-Th, 07.00 - 16.30 hrs, Alt. Fri: 07.00-15.30 hrs.
- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Kopec
Primary Examiner

Kmv
June 24, 2004